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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/553,366

10/13/2005

Wiebe Sjoerd Kijlstra

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SHELL OIL COMPANY
P O BOX 2463
HOUSTON, TX 772522463

EXAMINER

WU, IVES J

ART UNIT

PAPER NUMBER

1797

MAIL DATE

DELIVERY MODE

11/07/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/553,366	Applicant(s) KIJLSTRA ET AL.	
	Examiner IVES WU	Art Unit 1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 February 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>10/13/2005;02/27/2006</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

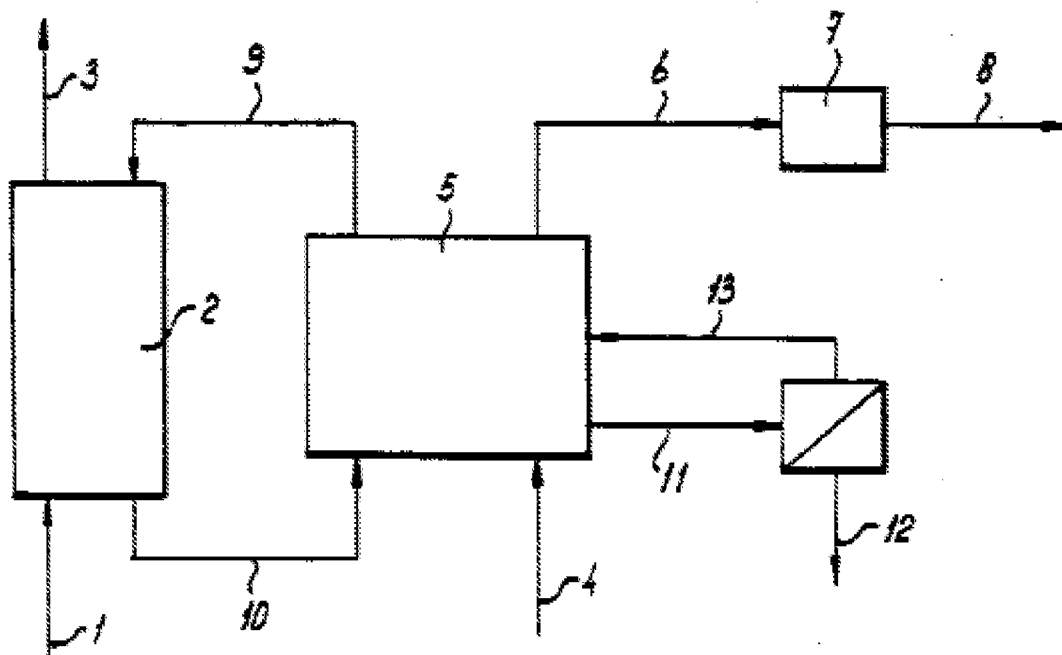
The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

(1). **Claims 1-10** are rejected under 35 U.S.C. 103(a) as being unpatentable over Buisman (US 5354545A) in view of Fernandez de la Vega et al (US 5659109A) Evidenced by LaFoy (US 4562300).

As to step a) of removing H₂S from the gas stream by contacting the gas stream in a H₂S removal zone with 1st aqueous alkaline washing liquid to obtain a H₂S-depleted gas stream and a sulphide-comprising aqueous stream; step b) of removing mercaptans from the H₂S-depleted gas stream obtained in step a) by aqueous alkaline washing liquid to obtain a mercaptan-depleted gas stream and an thiolate-comprising aqueous stream in a process for the removal of H₂S and mercaptan from a gas stream comprising these compound in **independent claim 1**, Buisman (US 5354545A) discloses process for the removal of sulphur compounds from gases (Title). A process for the removal of sulphur compounds from a gaseous effluent, comprising the steps of: a) contacting the gaseous effluent with an aqueous solution wherein sulphur compounds are dissolved (Abstract, line 1-4). The process for removing H₂S and other reduced sulphur compounds such as lower alkyl mercaptans is illustrated with reference to Fig. 1. At the start of the process, an alkaline washing liquid will be used (Col. 3, line 57-60). Buisman **does not teach** separate step a) and b) for the removal of H₂S and mercaptans as claimed.

Fig -1



B

However, Fernandez de la Vega et al (US 5659109A) **teach**, where high levels of mercaptans being encountered, removal techniques specific to mercaptans must be used in addition to the treatment process for carbon dioxide and hydrogen sulfide (Col. 1, line 21-24). As evidenced by LaFoy (US 4562300) that mercaptan extraction process uses alkaline solution composition for the removal of mercaptan.

The advantage of separate step in addition to the H₂S removal step is to remove mercaptan when high level of mercaptans is contained in the stream.

Therefore, it would have been obvious at time of the invention to add additional step after the step of removal of H₂S as disclosed by Fernandez de la Vega et al for the process of Buisman in order to attain the advantages cited above.

As to step c) of contacting the combined aqueous streams comprising sulphide and thiolates obtained in step a) and step b) with sulphide-oxidizing bacterial in the presence of oxygen in an oxidation reactor to obtain a sulphide slurry and a regenerated aqueous alkaline washing liquid in a process in **independent claim 1**, Buisman (US 5354545A) discloses step c)

of subjecting the aqueous solution containing sulphide to sulphide-oxidizing bacteria in the presence of oxygen in a reactor wherein sulphide is oxidized to elemental sulphur (Abstract, line 7-11).

As to step d) of separating at least part of the sulphur slurry obtained in step c) from the regenerated aqueous alkaline washing liquid in a process in **independent claim 1**, Buisman (US 5354545A) discloses in the Figure above, line 11, the production of sulphur will result in a sulphur slurry (11) which is partially drawn off (Col. 6, line 18-20).

As to step e) of recycling the regenerated aqueous alkaline washing liquid to the H₂S-removal zone in step A) and to the mercaptan-removal zone in step b) in a process in **independent claim 1**; recycling from the oxidation reactor to the H₂S-removal zone in step a) and to the mercaptan-removal zone in step b) in **claim 2**, as shown in the Figure 1 above line 9 shows the recycling of regenerated washing liquid to the scrubber, it would be obvious to the 2nd scrubber as the teaching of Fernandez de la Vega et al is combined.

As to washing liquid in step a) being buffered in **claim 3**, washing liquid in step b) being buffered in **claim 4**, the contents of oxidation reactor in step c) being buffered in **claim 5**, Buisman (US 5354545A) discloses an important feature being that the washing liquid is buffered, preferably at a pH between 6.0 and 9.0 (Col. 2, line 42-44). Addition of buffering compounds can be done after the washing liquid has left the gas scrubber (Col. 2, line 60-62). It would apply to 2nd scrubber for mercaptan as the teaching of Fernandez de la Vega et al is combined.

As to H₂S concentration in step a) to be between 50 ppmv and 90 vol% in **claim 6**, Buisman (US 5354545A) discloses concentration H₂S to be 0.8 to 1.0% in Table A, which reads on the limitations as claimed.

As to H₂S concentration of mercaptan-depleted gas stream to be less than 10 ppmv, especially between 0.01 and 10 ppmv, based on total mercaptan-depleted gas stream in **claim 7**, concentration of mercaptan compounds in mercaptan-depleted gas stream being less than 6 ppmv based on total mercaptan-depleted gas stream in **claim 8**, in view of the identical apparatus of combined teaching by Buisman, Fernandez de la Vega et al, it would produce the mercaptan-depleted gas stream with H₂S, mercaptan concentration as claimed as appropriate operating conditions is established..

Art Unit: 1797

As to gas-treating unit for removal of H₂S and mercaptans from a gas stream comprising these compounds, gas treating unit comprising at least two gas scrubbers with inlets and outlets, at least one oxidation reactor with inlets and outlets and a solid/liquid separator with an inlet and outlets, the 1st gas scrubber having a discharge line for gas debouching into the inlet of the 2nd gas scrubber, the 1st and 2nd gas scrubbers both having a discharge line for liquid debouching into the oxidation reactor, the oxidation reactor having an outlet debouching into the inlet of the solid/liquid separator, an outlet for liquid debouching into the inlets of the 1st gas scrubber and 2nd gas scrubber in **independent claim 9**, the disclosure of Buisman, Fernandez de la Vega et al is incorporated herein by reference, the most subject matters as currently claimed, have been recited in applicants' claim 1, discussed therein, with further illustration in the Figure above.

As to 1st and 2nd gas scrubber being placed on top of each other in one vessel in **claim 10**, it would be obvious to have two scrubbers being placed on top of each other in one vessel as the teaching of Fernandez de la Vega et al is combined because re-arrangement of parts renders obvious. *In re Kuhle*, 526 F.2d 553, 188 USPQ 7 (CCPA 1975).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to IVES WU whose telephone number is (571)272-4245. The examiner can normally be reached on 8:00 - 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Duane Smith can be reached on 571-272-1166. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Examiner: Ives Wu

Art Unit: 1797

Date: November 3, 2008

/Duane S. Smith/

Supervisory Patent Examiner, Art Unit 1797

11-4-08

Application/Control Number: 10/553,366
Art Unit: 1797

Page 6